

## **Constructing the “Best” Reliability Data for the Job - Developing Generic Reliability Data from Alternative Sources Early in a Product’s Development Phase**

Reliability practitioners advocate getting reliability involved early in a product development process. However, when assigned to estimate or assess the (potential) reliability of a product or system early in the design and development phase, they are faced with lack of reasonable models or methods for useful reliability estimation.

Developing specific data is costly and time consuming. Instead, analysts rely on available data to assess reliability. Finding data relevant to the specific use and environment for any project is difficult, if not impossible. Instead, analysts attempt to develop the “best” or composite analog data to support the assessments.

Industries, consortia and vendors across many areas have spent decades collecting, analyzing and tabulating fielded item and component reliability performance in terms of observed failures and operational use. This data resource provides a huge compendium of information for potential use, but can also be compartmented by industry, difficult to find out about, access, or manipulate.

One method used incorporates processes for reviewing these existing data sources and identifying the available information based on similar equipment, then using that generic data to derive an analog composite. Dissimilarities in equipment descriptions, environment of intended use, quality and even failure modes impact the “best” data incorporated in an analog composite. Once developed, this composite analog data provides a “better” representation of the reliability of the equipment or component. It can be used to support early risk or reliability trade studies, or analytical models to establish the predicted reliability data points. It also establishes a baseline prior that may be updated based on test data or observed operational constraints and failures, i.e., using Bayesian techniques.

This tutorial presents a descriptive compilation of historical data sources across numerous industries and disciplines, along with examples of contents and data characteristics. It then presents methods for combining failure information from different sources and mathematical use of this data in early reliability estimation and analyses.